is Eclipſed, for it alwayes paſſes between the lines 1 2, and 3 4.

To which I ſay, That if the Air be ſuch, as I have newly ſhewn it to be, and conſequently cauſe ſuch an inflection of the Rays that fall into it, thoſe dark *Penumbra's* FYZQ, HXVT, and ORPS, will all vaniſh. For if we ſuppoſe the Air indefinitely extended, and to be no where bounded with a determinate refracting ſurface, as I have ſhewn it uncapable of having, from the nature of it; it will follow, that the Moon will no where be totally obſcured, but when it is below the Apex N, of the dark blunt Cone of the Earth's ſhadow: Now, from the ſuppoſition, that the Sun is diſtant about ſeven thouſand Diameters, the point N, according to calculation, being not above twenty five terreſtrial Semidiameters from the Center of the Earth: It follows, that whenſoever the Moon eclipſed is totally darkned, without affording any kind of light, it muſt be within twenty five Semidiameters of the Earth, and conſequently much lower then any Aſtronomers have hitherto put it.

This will ſeem much more conſonant to the reſt of the ſecundary Planets; for the higheſt of *Jupiter's* Moons is between twenty and thirty *Jovial Semidiameters* diſtant from the Center of *Jupiter*; and the Moons of *Saturn* much about the ſame number of *Saturnial Semidiameters* from the Center of that Planet.

But theſe are but conjectures alſo, and muſt be determin'd by ſuch kind of Obſervations as I have newly mention'd.

Nor will it be difficult, by this *Hypotheſis*, to ſalve all the appearances of Eclipſes of the Moon, for in this *Hypotheſis* alſo, there will be, on each ſide of the ſhadow of the Earth, a *Penumbra*, not caus'd by the Refraction of the Air, as in the *Hypotheſis* of *Kepler*; but by the faint inlightning of it by the Sun: For if, in the ſixth Figure, we ſuppoſe ESQ, and GSR, to be the Rays that terminate the ſhadow from either ſide of the Earth; ESQ coming from the upper limb of the Sun, and GSR from the under; it will follow, that the ſhadow of the Earth, within thoſe Rays, that is, the Cone GSE, will be totally dark. But the Sun being not a point, but a large *area* of light, there will be a ſecondary dark Cone of ſhadow EPG, which will be caus'd by the earth's hindring part of the Rays of the Sun from falling on the parts GPR, and EPQ. of which halved ſhadow, or *Penumbra*, that part will appear brighteſt which lyes neareſt the terminating Rayes GP, and EP, and thoſe darker that lye neareſt to GS, and ES: when therefore the Moon appears quite dark in the middle of the Eclipſe, ſhe muſt be below S, that is, between S and F; when ſhe appears lighter near the middle of the Eclipſe, ſhe muſt paſs ſome where between RQ and S; and when ſhe is alike light through the whole Eclypſe, ſhe muſt paſs between RQ, and P.

Obſerv.

Obſerv. LIX. *Of multitudes of ſmall* Stars *di* Teleſcope.

HAving, in the laſt Obſervation, premis'd ſome parti in the *medium*, through which we muſt look upon I ſhall here add one Obſervation of the Bodies them *ſpecimen* I have made choice of the *Pleiades*, or ſeven St called (though in our time and Climate there appear to the naked eye) and this I did the rather, becauſe t mous *Galileo*, having publiſht a Picture of this *Aſteri* ſeems, with his Glaſs to diſcover no more then thirty ſix pretty good twelve foot *Teleſcope*, by which I drew this 3 very plainly diſcover ſeventy eight, placed in the orde in the Figure, and of as many differing Magnitudes wherewith they are Marked, do ſpecifie; there being teen ſeveral Magnitudes of thoſe Stars, which are com draught, the biggeſt whereof is not accounted greate third Magnitude; and indeed that account is much too pared with other Stars of the third Magnitude, eſpecial a *Teleſcope*; for then by it may be perceiv'd, that its ſple ked eye, may be ſomewhat augmented by the three litt ately above it, which are near adjoyning to it. The *Te* vers a great variety, even in the bigneſs of thoſe, commo the firſt, ſecond, third, fourth, fifth, and ſixth Magnitud they be diſtinguiſh'd thereby, thoſe ſix Magnitudes wo ford no leſs then thrice that number of Magnitudes, p ſtinguiſhable by their Magnitude, and brightneſs; ſo th foot Glaſs would afford us no leſs then twenty five ſeve Nor are theſe all, but a longer Glaſs does yet further, b diſtinguiſh the Magnitudes of thoſe already noted, and veral other of ſmaller Magnitudes, not diſcernable by Glaſs: Thus have I been able, with a good thirty ſix foo ver many more Stars in the *Pleiades* then are here delin of three or four diſtinct Magnitudes leſs then any of t fourteenth Magnitude. And by the twinkling of diver this *Aſteriſme*, when the Sky was very clear, I am apt to longer Glaſſes, or ſuch as would bear a bigger *aperture* diſcovered multitudes of other ſmall Stars, yet inconſp deed, for the diſcovery of ſmall Stars, the bigger the better adapted is the Glaſs; for though perhaps it does ſpecks more radiant, and glaring, yet by that means, u very near to one point, it does make many of thoſe radi